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TEN DAYS IN CAMP ON MT. PELÉ,
MARTINIQUE.

THE VOLCANO SIX YEARS AFTER THE
GREAT ERUPTION.

BY


EDMUND OTIS HOVEY.

REPRINTED FROM

BULLETIN OF THE AMERICAN GEOGRAPHICAL SOCIETY,

VOL. XL, NOVEMBER, 1908.

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TEN DAYS IN CAMP ON MT. PELÉ, MARTINIQUE.*

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When the news was flashed all over the world early in May, 1902, that Mt. Pelé, Martinique, and the Soufrière, St. Vincent, supposedly extinct volcanoes in the Caribbean Islands, had broken out in violent eruption, killing thousands of human beings and devastating great areas of land, geologists, magazine writers, and artists, as well as newspaper reporters, were hurriedly sent to the scene from France, England and America.

The experiences of the weeks spent on and near the great volcanoes were sufficiently varied, exciting and dangerous to satisfy the most eager pursuer of the sensational, and Mt. Pelé and its eruptions were studied, described and photographed as no volcano had ever been before. Scientific and even popular interest in the mountain were actively continued by the great dome and "spine" of lava that were pushed up in strange fashion in the midst of the old crater of Mt. Pelé the following autumn and maintained there at strangely varying altitudes for several months.

Six years and more have now elapsed since the eruption began, and many changes have taken place in the islands. The "spine" of Pelé literally fell to pieces in the latter part of 1903, and the last real puff from the volcano occurred in July, 1905, while the Soufrière quieted down so much after the outburst of March 26, 1903, that not even a vestige of steam could be seen two years later. Erosion under tropical rains goes forward rapidly on barren or deforested slopes, while vegetation gains foothold quickly in the tropics. Hence, in the Spring of 1908, the American Museum of Natural History sent me for the third time to the islands to observe the changes that had taken place and to collect specimens from locali-

* Published with the permission of the American Museum of Natural History. Third expedition (1908) aided by a grant from the Esther Hermann Research Fund of the New York Academy of Sciences.

ties, particularly the dome of Pelé, that were inaccessible on the previous visits.

Towns and plantations are so far from the field in both islands that much valuable time is lost in unproductive walking or riding, hence I decided to attempt to camp out on the mountains. My wife accompanied me, and we carried out our project so satisfactorily that an account of our experiences may be worth while. We took waterproof tents, tools, camp outfit and provisions with us from New York, so that we could be entirely independent, if need be, of any supplies to be found in the islands. We even carried with us alcohol for all fuel, because the regions to be occupied are entirely destitute of wood or charcoal. Everything had to be arranged in packages not exceeding 60 to 75 pounds in weight, since the whole outfit was to be carried some miles at each locality on men's heads.

We landed at Fort de France, the capital and metropolis of Martinique, on the 27th of April, and proceeded toward St. Pierre two days later by the little coasting steamer, of exceedingly unsavoury odor, called the "Diamant." This boat landed us with our outfit at Le Carbet, a village two and one-half miles south of our destination. From Le Carbet we had to go by canoe to the ruined city. On account of our camp outfit we had so much baggage that we were quite anxious for its safety in the apparently frail craft that the natives use for travel and fishing. The sea was calm, however, no accident happened to us or our things, and, in the course of an hour, we reached the little hotel which has been built on Rue Victor Hugo, the old main street of St. Pierre, beside the Place Bertin, once the beautiful seaside park of the city. The "hotel" is extremely modest in size, appearance and appointments, containing only two sleeping-rooms for guests, besides the dining-room, the office and a little store; but one can spend a night or two here or even a longer time in comfort, though St. Pierre is still hotter in its ruined condition than it was in its prosperity, and the city was always notorious for its heat.

Aside from the presence of the hotel, there are not many signs of resuscitating the city. Rue Victor Hugo has been cleared of ash throughout its length, also the streets connecting with the roads to Morne Rouge and Fort de France, the street leading to the old cemetery behind the Church of the Anchorage and that leading to the ruins of the bank, where the headquarters of the police have been established. Here and there a building has been cleared of *débris* in order to rescue articles or material of value, but the work thus far done is only enough to show the more than herculean nature of

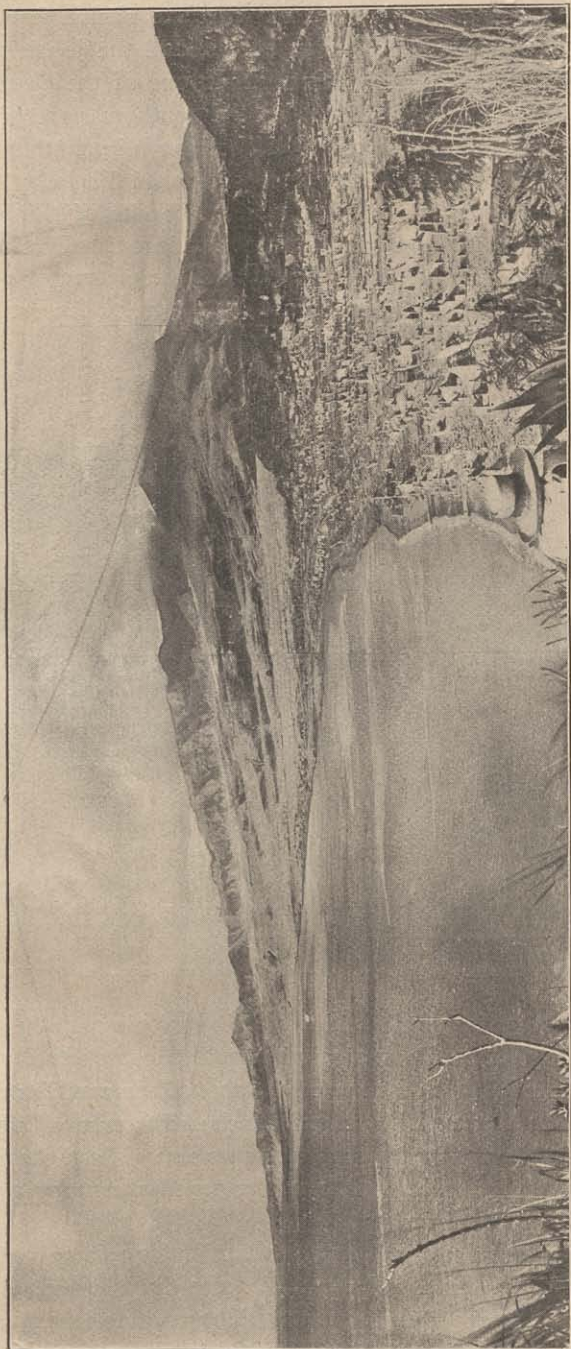


FIG. 1.—SAINT PIERRE FROM PEDESTAL OF STATUE OF THE VIRGIN ON MORNE D'ORANGE. FEBRUARY, 1923.

the task of clearing the city of from three to twelve feet of filling due to the eruption and following events, and the job is not likely soon to be undertaken systematically. In one of the cleared buildings, near the Lasserre distillery in the southern part of town, a squatter has put up and occupies a little shanty; in another, near the hotel, the "village blacksmith" has established his shop. A substantial wooden pier has been built near the site of the lighthouse on Place Bertin, and regular steamboat service with Fort de France was to be established in June. The city is the picture of desolation,



FIG. 2.—SAINT PIERRE, MAY, 1908. MONT PELÉ, RUE VICTOR HUGO, ETC., FROM THE HOTEL PIAZZA.

looking to me more hopeless of rebuilding within a generation than it did directly after the great eruptions. Most of the walls then standing have fallen, adding much to the *débris* contributed by the volcano and to that washed down from the hills surrounding the city, and grass and bushes are growing everywhere amid the ruins. The place looks as if the city had been destroyed a century ago, rather than only six years since.

St. Pierre, however, is the natural outlet for a large and productive agricultural region, and somewhat of a town is sure to grow up here, as confidence in the quiescence of the volcano increases, though many years must elapse before the city regains any of its old com-

H. H. Huelin

mercial importance. The people of Martinique are afraid of "la Montagne Pelée," and with good reason; but there is no probability of a recurrence of the terrific blast that swept over the site six years ago. Prior to May 8, 1902, Mt. Pelé had a great open crater, similar to those now existing on the islands of Nevis and Montserrat, about five-eighths of a mile across and 2,100 feet deep beneath Morne Lacroix, the highest point of its rim. The southwest wall of the crater was breached to its bottom with a V-shaped cleft opening into the head of the gorge of the Rivière Blanche. When the great explosion occurred at 7:45 A.M., May 8, 1902, its expansive force was

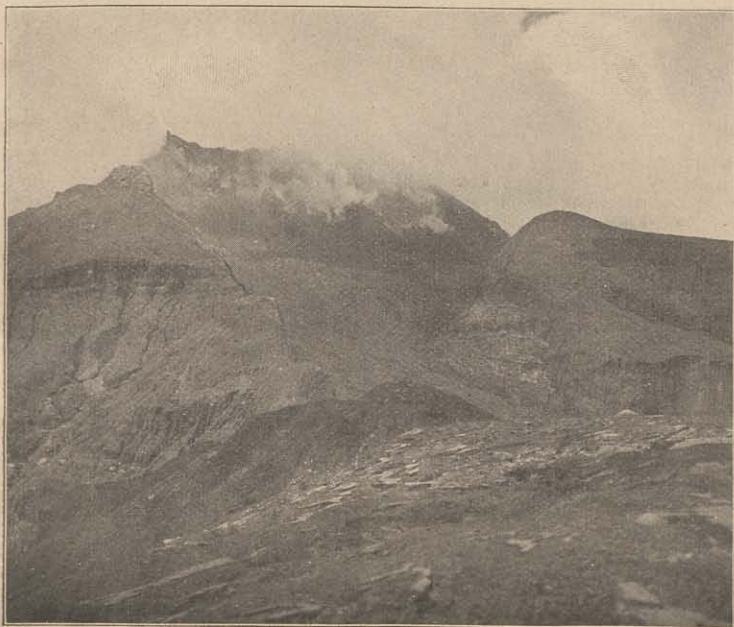


FIG. 3.—MONT PELÉ, MAY, 1908. FROM THE SOUTHWEST. NEW CONE WITH FUMAROLAS.
GREAT V-SHAPED CLEFT LEADING DOWN INTO RIVIÈRE BLANCHE.

opposed on the north, east and southeast by the solid walls of the crater, which added strength and gave direction to the portion of the cloud issuing through the cleft. The cleft was in the side of the mountain toward St. Pierre. Now a vast new cone, largely composed of solid rock, practically fills the old crater and rises about 400 feet above the highest part of its rim. There is no directive cleft in high walls to concentrate any part of an eruption cloud into a definite blast, and ruin would be wrought in all directions, as on August 30, 1902, the degree depending upon the initial violence of the explosion, and the distribution upon the exact location of the vent or

vents. At the distance of St. Pierre such an eruption might give a heavy deposit of ash, but would not be liable to destroy property or life south of the mouth of the Roxelane River.

After two days spent amid the ruins of the city and in visiting the government volcano observatory and weather station at Morne des Cadets, about three miles east of St. Pierre, now under the able direction of M. L. Guinoiseau, formerly adjutant of artillery in the French army, we started with our camp outfit for the Rivière Blanche, to establish ourselves at as high a point as possible on the

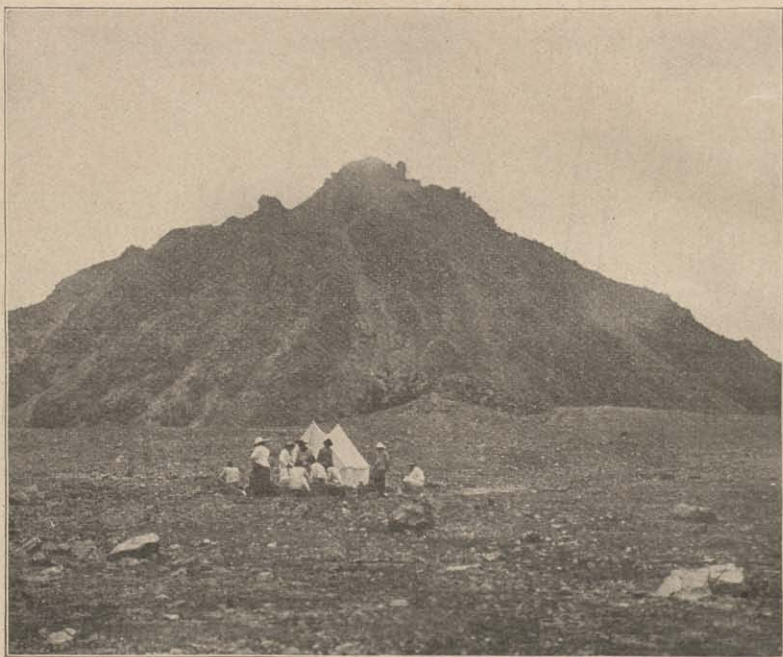


FIG. 4.—MONT PELÉ, MAY, 1908. THE NEW CONE FORMED OF ROOTS AND DÉBRIS OF THE OLD SPINE. CAMP IN BASIN OF THE LAC DES PALMISTES.

western flank of the mountain. Seven porters walked along the shore, while we proceeded leisurely by water in a good "built-up dug-out" canoe with two oarsmen and a steerer. Two hundred yards or more north of the site of the Guérin sugar factory, the first victim of Pelé's wrath, we beached our boat, and our packages were soon on the ground, where the porters overhauled them carefully and sorted them out for transportation up the slope. It was interesting to see the men go about testing different combinations to make sure that the loads were as nearly uniform as possible, and the animated discussion that ensued was like the chattering of magpies. The leader

considered my camera box heavy enough to constitute a load by itself, but some of the men to whose lot two packages had fallen thought otherwise. They changed their minds, however, when they went over and tested the camera box for themselves, and the procession up the ash-filled river bed finally began, each porter carrying one or two packages on his head.

The V-shaped cleft opening from the crater into the head of the deep gorge of the Rivière Blanche was the outlet for hundreds of dust-laden, exploding steam clouds during the three-year period of eruptive activity that began in May, 1902. These left behind millions of cubic yards of fragments varying in size from the finest dust to blocks 30 feet across, filling the gorge like a stream of some strange fluid which congealed as it ran. The exact depth of the cañon existing here before the eruptions is not known; hence the depth of the new deposit of ash can only be estimated, but there is good reason for thinking it to be not less than 500 feet deep in places. In March, 1903, the surface of this slope consisted of dry, almost impalpable dust scattered over with large blocks. Into the dust one sank half-way to the knee at almost every step, and the already difficult progress was rendered extremely disagreeable in the tropical heat by the whirlwinds coursing through the valley and driving the dust into one's face. Now all this fine dust has been washed away or cemented into tenacious cakes that resist farther erosion, and progress is comparatively easy for three miles or more up the line of the old gorge. At this distance from the sea the deep ravine with vertical sides that has been cut along the left wall of the old gorge crosses to the other wall and, in connection with other higher ravines, renders impracticable the attainment of the top of the cone by this route.

About two miles from the coast M. Guinoiseau, who accompanied us, pointed out the little sand plain twelve hundred feet above the sea where we could best make our camp. We halted in the broiling sun and awaited the arrival of our perspiring porters, who had found the ascent under a cloudless sky decidedly hot, and straggled rather slowly in. After a few minutes of rest and a drink all around from the demijohn of water "headed" up by one of the men, they recovered their breath and we set up our tents and made camp. There was not a stick of wood for a tent-pin within four miles of our campsite, but rocks were abundant and made good anchors for the tents. The chief difficulty with this Rivière Blanche camp was the lack of water. The nearest source of good supply was at sea-level and more than four miles distant, and one porter was kept busy a good part of

each day trudging back and forth with the demijohn. We surprised ourselves by learning the small amount of water with which we could get along under such circumstances. In spite of the fact that the rainy season was supposed to have begun, we did not collect more than half a gallon of water altogether from our tent roofs and two large collecting cloths during the four nights spent at this camp. We used alcohol stoves for most of our cooking, but we pressed the internal heat of the earth into service too. Our camp was beside the lower end of the fumarole area a quarter of a mile or more long that exists in the divide between the Rivière Blanche and the Rivière

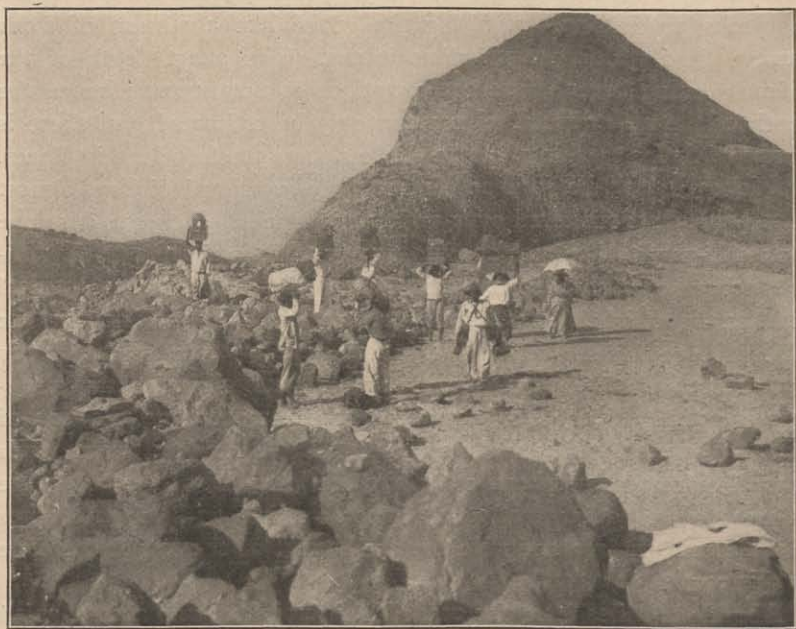


FIG. 5.—MT. PELÉ, MAY, 1908. RIVIÈRE BLANCHE CAMP. PORTERS WITH BAGGAGE AND CAMP EQUIPMENT.

Claire, and about 50 yards from our tents we found one that was just right for boiling all kinds of food. Here we dug a hole large enough for a camp kettle and did part of our cooking in it. If we had only known in advance the convenient location of these fumaroles we might have left alcohol stoves at home!

These vents are arranged in a line practically radial to the crater, and they vary in temperature from 68 degrees centigrade (154 degrees Fahrenheit), at the opening furthest from the crater, to 305 degrees centigrade (581 degrees Fahrenheit), at those nearest to it. The highest fumaroles in both temperature and position are about a

mile horizontally from the central conduit of the volcano, if there is one. Their position, high temperatures six years after the eruption that deposited the ash in which they actually occur and their sympathetic increase and decrease in temperature with the increase and decrease of activity of the volcano itself indicate that they are probably not secondary steam vents releasing heat from the interior of a superficial ash bed, but that they may be true fumaroles, connecting through deep fissures with the internal heat of the earth. The character of the vents, however, is still open to some dispute. As far as known, these and a (probably) secondary fumarole in the ravine of the Blanche are the only steam vents now existing in the mountain aside from those in the cone and crater itself. For many months after the volcano renewed its severe activity the great deposits of hot ash in the valleys of the Claire, Blanche, Sèche and Falaise rivers and on the plateau between the Blanche and the Sèche rivers steamed vigorously and even had localized outlets from which great columns of steam rose when rain or river water penetrated to the heated interior of the beds. These vents, however, were secondary affairs and, having no deep-seated source of heat or any connection through fissures with the volcanic conduit, ceased their activity entirely, with the single apparent exception just noted, as soon as the ash cooled down to the normal temperature of the surface earth.

The immediate surroundings of our camp were impressive from their absolute desolation. We were on what had originally been a narrow divide between the deep gorge of the Rivière Blanche on the southeast and that of the Rivière Claire on the northwest, but the "divide" was gone, for at this point the gorge of the Blanche was completely filled with volcanic *débris*, and some of the material had literally flowed over into the Claire. There was no vegetation here and no animal life, not even a fly or a mosquito, while the gently steaming fumaroles gave a weird aspect to the whole that was intensified in the half-light and cool atmosphere of early morning and late afternoon. The sloping plain of the Blanche was thickly strewn with boulders and angular fragments of rock of all sizes with here and there a little patch of sand, but not a sign of life was visible anywhere, not even a blade of grass or an ant. The surrounding hillsides had been scored so deeply and so often by terrific blasts from the crater that they too were barren of vegetation. Our view toward the northeast was the strangest of all, for above the barren slopes in that direction was the rough, rude cone of the volcano with its white crown of vigorous fumaroles.

If our surroundings were somewhat depressing during the day

from their deadness and from their unmitigated reflection of the dreadful sunlight, they were entrancing in their wealth of colour when touched by the rays of the setting sun. Reds, yellows, browns, purples were there in constantly shifting shades, enough to be the despair of the artist and the delight of the average mortal. Best of all, perhaps, was the scene under the brilliant light of the moon, whose silver rays softened marvelously the harsh outlines of barren rock and denuded cliff. Starlight, too, gave us another variation, when the weirdness of black bluff and gorge was intensified by the thought of the great and still active volcano so near at hand, which



FIG. 6.—MONT PELÉ, MAY, 1908. RIVIÈRE BLANCHE CAMP. COOKING OVER A FUMAROLE.

not long ago sent hundreds of superheated blasts over the very spot where our tents were standing.

From the "Hôtel des Fumerolles," as we called our camp, being in a French island, I made geological excursions all over the south-western side of the mountain and up to its summit plateau, the basin of the former Lac des Palmistes, by way of the ridges southeast of the Rivière Blanche, following the route traversed twice by Mr. George C. Curtis and myself in June, 1902, at the peril of our lives. In the past six years erosion has done a tremendous amount of work on the slopes and in the gorges of the denuded mountain. Old waterways have been widened and new ones have been cut, com-

pletely changing the surface features of the region in many places. Here and there, however, one can see a bit of old pavement or a fragment of wall indicating the location of one of the famous plantations of Martinique, obliterated by the eruption. Even the soil was often erased from the ground, leaving a planed surface of old cemented volcanic ash. This generally remains bare of vegetation, but many protected places and gullies where moisture has stayed



FIG. 7.—MONT PELÉ, MARCH 26, 1903. THE GREAT SPINE OR OBELISK THAT SURMOUNTED THE NEW CONE WITHIN THE CRATER. THIS MASS OF NEW LAVA EXUDED IN EXTREMELY VISCOUS CONDITION, TOO VISCOUS TO FORM AN ORDINARY FLOW. AT THE DATE GIVEN IT STOOD 358 METRES (1,174 FEET) ABOVE THE CRATER RIM AT THE LEFT OF THE MAN.

longer than elsewhere have given vegetation a chance to start, and grass and bushes have crept half way up the south side of the mountain. The new ash resists decomposition into soil, wherever it remains dry or is well drained, hence vegetation is slow to take root in it. This is particularly true of the mud flows, for they have consolidated into real rock masses. That covering part of the site of the

Guérin sugar factory is a barren red bluff of agglomerate rising 15 to 25 feet above the general level of the uneven plain of new ash at the old mouth of the Rivière Blanche.

After finishing for the time being my work on the southwest side of the mountain, we moved camp to the basin of the Lac des Palmistes, the old summit plateau of Mt. Pelé. This was quite an undertaking, for the baggage had to be headed down to the coast, taken by canoe to St. Pierre, thence by oxcart 17 miles to Capot on the northeast coast of the island, from there by oxcart again four or five miles to about 1,700 feet above the sea on the slopes of the mountain, and

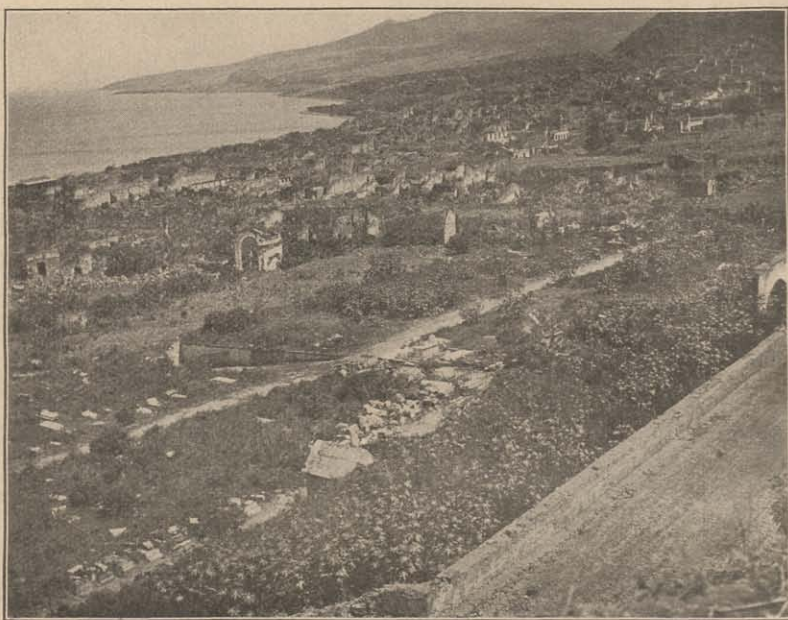


FIG. 8.—SAINT PIERRE, MAY, 1908. LOOKING NORTHWEST FROM THE ROUTE TO MORNE D'ORANGE.

the last stage of two or three miles was heading the packages to the summit plateau at about 4,000 feet above the sea, a circuit of 30 miles to move camp less than two miles in a straight line! These distances do not seem very long as one writes them, but their accomplishment consumed much time and labour on account of the grades of the roads and trails and the height to be attained.

The basin of the Lac des Palmistes, the pretty pond that adorned the top of the mountain before the eruption, is 4,000 feet above the level of the sea and is covered with clouds more than nine-tenths of the time. We were extremely fortunate in reaching the plateau just

as the clouds lifted entirely from the mountain, not only giving us a splendid view of the great new cone within the old crater, the particular object of my study, but also allowing me to choose a camp-site and set up our tents under favourable conditions. We found the spot which had been utilized by the two French engineers who made a topographic survey of the cone and crater in January, 1908, and soon saw that it was the place for us. Here we fell heir to half a dozen good stakes, but again plenty of big stones were at hand and formed excellent anchors. We had need of them, too, for the wind blew a gale practically all of the five days that we spent on the sum-

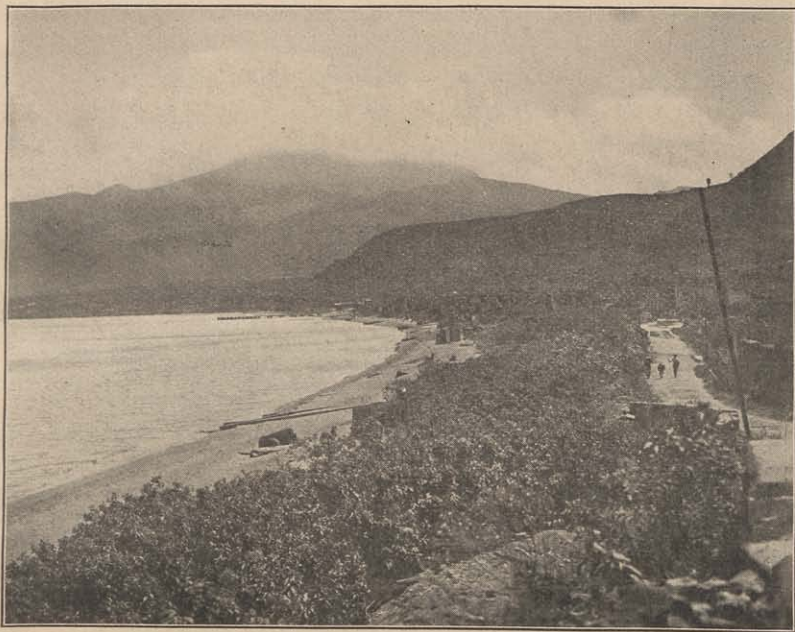


FIG. 9.—SAINT PIERRE FROM THE ROUTE TO CARBET, MAY, 1908. SHOWS THE GROWTH OF VEGETATION.

mit. The whistling of the wind over the sharp edge of the crater rim not 150 yards distant was quite terrifying during the night, before we knew what it was and got used to it. The temperature was much lower at this camp, the "Hôtel du Bassin du Lac des Palmistes," than at the Fumarole Hotel, not rising above 65 degrees during the day and being only 58 or 59 degrees during the night. In spite of the prevailing cloud, our camp on the mountain top was "dry" and we did not catch water enough to wash our hands, hence every day our man had to descend 2,000 feet and tramp three miles and back for our supply of water.

The most peculiar and instructive feature of the eruption of Pelé was the formation within the old crater of the new cone to which reference has been made. The lava of this eruption is of a type that fuses only at a very high temperature, and so much water vapour (steam) came to the surface in connection with the eruption that the lava issued from the vent in a viscous condition and was not sufficiently fluid to flow like the ordinary streams of Vesuvius. The lava, therefore, welled up through the vent, solidifying as it came and forming a conical mass over the orifice in the bottom of the old crater. In the early days of the eruptions the explosive character

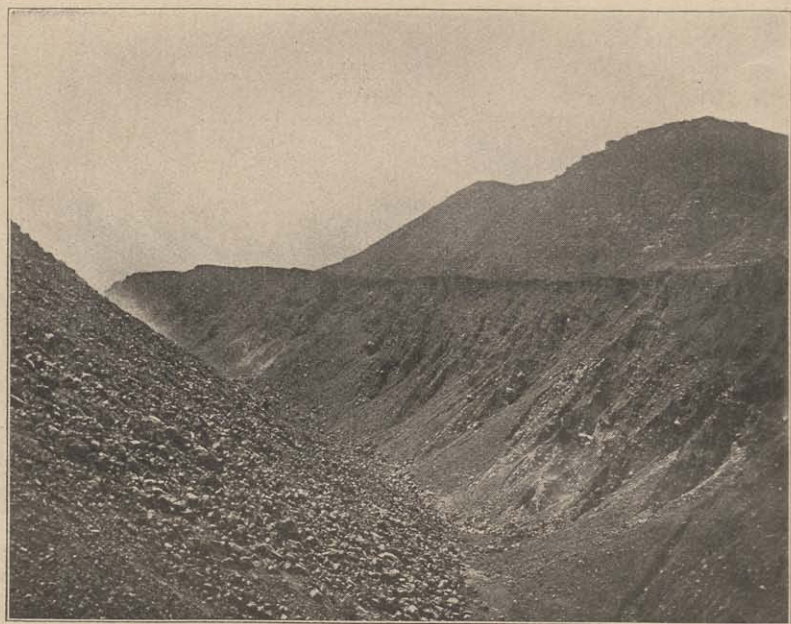


FIG. 10.—MONT PELÉ, MAY, 1908. BASE OF NEW CONE AT THE LEFT, SPIRAL VALLEY IN CENTRE AND RIM OF OLD CRATER AT THE RIGHT. HEIGHTS OF MACOUBA IN BACKGROUND.

of the issuing clouds was so strong and the explosions came so frequently that the cone was destroyed almost as fast as it was made. Still, its top was above the level of the Lac des Palmistes basin a month after the occurrence of the fatal blast that destroyed St. Pierre, somewhat as was observed by Mr. Curtis and myself on our ascent of June 20, 1902.

By October, 1902, the relation between the exploding clouds and the up-welling lava was such that the former kept blowing away only the southwest and the northwest quarters of the cone as fast as or faster than it rose. This left a spire-like needle rising at the north-

east side of the cone, with a roof-like ridge running southwestward therefrom at half the height of the spire and completing the likeness of the profile to that of a cathedral. Fissures allowed the extrusion of many smaller and more temporary spines from different parts of the cone. The cone grew at a marvelous rate. According to observations and measurements made from the station at Morne des Cadets, the rise during part of the month of November, 1903, was at the rate of 41 feet per day. From time to time, on the other hand, the cone sank somewhat, or the top fell off, causing a loss of altitude which was regained shortly afterward. At its maximum development, May 31, 1903, the point of the needle or "spine" was 5,304 feet above the level of the sea, or nearly a thousand feet higher than the old summit of the mountain, Morne Lacroix, which was destroyed by the first outburst of the revived volcano. During this period Pelé was the highest mountain in all the Lesser Antilles.

Not content with having erected such a wonderful monument to the dead of St. Pierre, the volcano wrought the destruction of the spine and upper part of the cone a few months later. The disintegration was due to the fact that the spine was brittle and rifted in every direction, although it was composed of rock in place, not of *débris*. It simply could not maintain itself and it fell to pieces. The fragments, 50 to 60 feet across, now lie at the base of the new cone in the spiral valley between that and the wall of the old crater. Nine hundred feet of the mountain top thus fell away, and the present altitude of the apex of the cone is 4,444 feet above sea-level, which is only 16 feet above the height assigned to the old Morne Lacroix.

The climbing of the new cone is not unattended with excitement and difficulty. The trail to it leads westward from the Lac des Palmistes along the knife-like edge of the old crater rim nearly half a mile and then literally drops into the spiral crater valley, in the bottom of which are the enormous blocks resulting from the breaking to pieces of the great spine. The cone rises from this valley with a slope about 37 degrees from the horizontal upon which rock fragments lie so loosely that the least jar sends them sliding toward the bottom, rendering foothold extremely insecure and the advance of a party dangerous to the lower members of it. Half-way up the slope the trail passes through a group of fumaroles whose temperature is below the boiling-point, and here one feels for a few minutes that he is in some sort of a weird Russian bath. The fumaroles of the upper regions are much hotter and one carefully avoids them, while the hottest of all are in the very top, where M. Guinoiseau and

I determined, with the aid of my electric pyrometer, the temperature in a branch of a great fissure to be 515° centigrade, or 959° Fahrenheit. The main fissure probably was hot enough to show visible incandescence at night. There are hundreds of fumaroles in the upper part of the cone and steam issues abundantly from them, but, as far as known, no ash has been thrown out in the past three years. The activity of the mountain has been gradually though intermittently

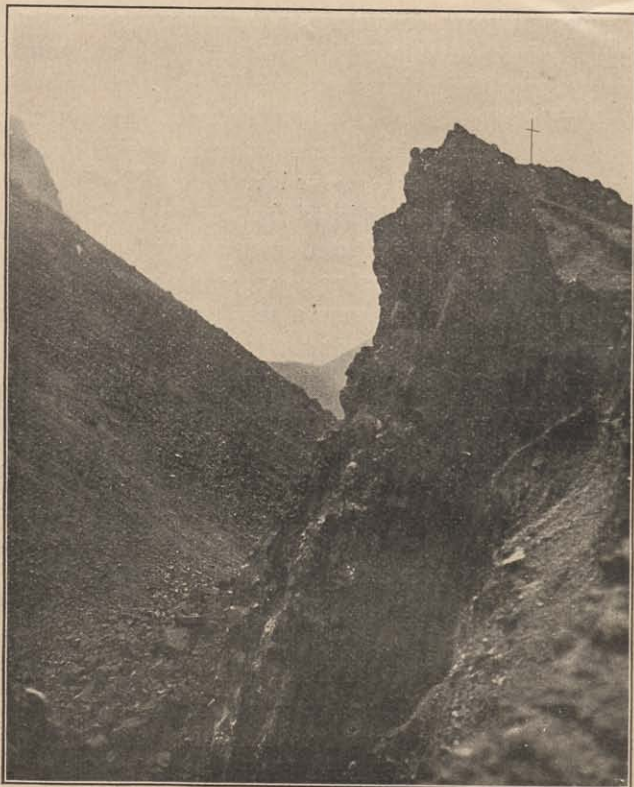


FIG. 11.—MONT PELÉ, MAY, 1903. REMAINS OF MORNE LACROIX AT THE RIGHT, BEARING THE CROSS. SPIRAL CRATER VALLEY AND BASE OF NEW CONE AT THE LEFT.

decreasing since the great outburst of August 30, 1902, and there seems to be no present indication of another outbreak. If, however, a new eruption should occur, it would probably take place from the western side of the cone, and be more severe over the leeward than over the windward side of the mountain. The wind usually blows a perfect gale on top of the mountain, so that when one is on the summit and scarcely able to stand, even when strongly braced, he does

not wonder at the confidence felt by the natives that the *débris* of an eruption would be driven westward. The wind, however, sometimes fails, and this happened when some of the eruptions took place, so that the ejecta went eastward as well as westward. Now the rock ledges in place occupy only a small part of the surface of the cone, while the fragments broken off from them cover nearly everything.

On the east side of Mt. Pelé vegetation has reasserted itself more strongly than on the southwestern, and the whole landscape is green with young trees, bushes and grass up to an altitude of 3,000 feet, and still higher on the north. As one now traverses the region or looks down upon it from the mountain heights, he can scarcely realize the extent of the barrenness and desolation of only five years ago. The moisture of so much cloud has induced moss to grow over the surface of the summit plateau (the basin of the Lac des Palmistes), and grass grows in the new ravines and in the crevices of the bombs and other boulders. We even picked ripe raspberries from bushes at the top of the trail.

Before leaving la Montagne Pelée, come with me to the "Salon" for a parting view of the weird crater and the vast new cone of the old volcano. The Salon is a nook in the southeast corner of the old crater formed by a small section of the rim that sank at the beginning of a landslide, but that stopped its downward course into the crater when its top was about fifteen feet below its old position. Here one is perfectly sheltered from the terrific wind and may enjoy crater and cone at leisure, if only the clouds lift sufficiently. The narrow spiral valley, 180 feet deep, lies at one's feet and rises gradually toward the north, with the vertical wall of the old crater at the right and the steep slide-rock slope of the new cone at the left. The meagre remains of the former apex of the mountain, Morne Lacroix, limit this part of the view and the new iron cross on top stands out in bold relief against the sky. The green of the moss-covered crater wall contrasts strongly with the bare rock of the cone, but the cone is beautiful with warm tones of reddish brown and an occasional streak of light yellow from the sulphur deposited by fumaroles, mingled with the general gray of the rock. The blunt top of the cone is a quarter of a mile across, with jagged pinnacles marking the base of the wonderful spine of short but famous history, while a chaplet formed of unnumbered fumaroles gives it a crown of glory. If only one can see this steaming cone in the light of the rising or the setting sun or under the radiance of the full moon, he will carry away with him a picture never to be forgotten and never to be confused with that of any other mountain.

